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Vertical Tillage Study

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Abstract
This project at the Southeast Research and Demonstration Farm was a four-year project designed to study the yield effects of vertical tillage systems compared with conventional and no-till systems in corn and soybeans. There has been increasing interest in vertical tillage systems in recent years, so the goal of this project was to compile information on these various cropping systems.

Disciplines
Agricultural Science | Agriculture

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Introduction

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Materials and Methods

This study was planted in two adjacent fields that were in a corn-soybean rotation. There were four different cropping systems (treatments). Treatment 1 consisted of Phoenix harrowing (PH) ahead of corn in the spring and no-tilling (NT) the soybeans. This treatment was a modified vertical tillage system. Treatment 2 was strictly NT in both corn and soybeans. Treatment 3 consisted of deep ripping (DR) in the fall and PH in the spring ahead of corn while tillage for soybeans consisted of chisel plowing (CP) in the fall and PH two times in the spring. This treatment was an example of an extensive vertical tillage system. Treatment 4 consisted of disking (DK) in the fall and field cultivating (FC) in the spring ahead of corn and CP in the fall and FC in the spring ahead of soybeans. This treatment was an example of a conventional, horizontal tillage system.

A John Deere 7000 planter was set to plant corn at 32,000 seeds/acre in 30-in. rows. For soybeans, this planter was set to plant 160,000 seeds/acre in 30-in. rows.

Soil samples suggested that phosphorus and potassium levels were optimal or higher, so these fertilizers were applied at maintenance rates. In addition, nitrogen in the form of anhydrous ammonia, was applied in the spring ahead of the corn crop. The soil samples also suggested that soil pH was within an optimal range so no adjustments were made.

The study was randomized and replicated four times. The farm superintendent selected the corn hybrid and soybean variety to be planted.

Results and Discussion

Yield results suggest that there were only small differences due to the various tillage systems as shown in Tables 1 and 2. However, the data suggest that, for corn, the vertical tillage system including deep ripping in the fall and Phoenix harrowing in the spring, yielded slightly more than the other three systems on average. Nonetheless, there were no major differences apparent, on average, for the four tillage systems in soybeans.

Acknowledgements

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Table 1. Effect of tillage systems on corn yields for 2005–2008 at Crawfordsville, IA.

Tillage	2005	2006	2007	2008	Avg
PH	183	184	160	160	172
NT	179	186	166	164	174
DR/PH	195	193	175	170	183
DK/FC	178	169	179	181	177

Table 2. Effect of tillage systems on soybean yields for 2005–2008 at Crawfordsville, IA.

Tillage	2005	2006	2007	2008	Avg
NT	59	58	52	50	55
NT	58	53	56	49	54
CP/2X PH	62	55	55	51	56
CP/FC	62	56	55	52	56